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**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT**

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PATENT

Serial No.: 09/835,164

Atty. Docket No.: CISCO-3840 (032590-141)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Shujin Zhang et al.

CONFIRMATION NO.: 4870

SERIAL NO.: 09/835,164

FILING DATE: 04/13/2001

TITLE: DYNAMIC HOST CONFIGURATION PROTOCOL PROXY

EXAMINER: Patel, Niketa I.

ART UNIT: 2181

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**MAIL STOP APPEAL BRIEF-PATENTS  
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Alexandria, VA 22313-1450**

**APPEAL BRIEF**

Dear Sir:

This paper is in support of a Notice to Appeal filed September 5, 2006, of the Office Action dated May 30, 2006, to the Board of Patent Appeals and Interferences.

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**Real Party in Interest**

Cisco Technology, Inc.

**Related Appeals and Interferences**

None.

**Status of Claims**

Claims 53-94 are pending:

- Claims 53-66 are allowed.
- Claims 67-94 are rejected and on appeal.

**Status of Amendments**

All amendments have been entered and there are no outstanding amendments after final.

**Summary of Claimed Subject Matter**

The invention relates to a method and apparatus for issuing or renewing a host address in a network that uses DHCP (Dynamic Host Configuration Protocol). Conventionally, as seen from FIG. 1 of the drawings, issuing or renewing host addresses in a DHCP network was conducted automatically, in a closed interaction between host devices (10a-10N) and address allocation devices (16a-16N). However, this closed approach precluded manual intervention by a network administrator, who in some instances needed to gain access to the process for any number or reasons, including defining, managing or controlling host address allocation, or implementing host address allocation policies.

In order to allow manual intervention, the invention interjects a DHCP proxy 40 (FIG. 4) between the host devices (10a-10N) and address allocation devices (16a-16N). The DHCP proxy 40 operates to reconfigure some communication packets exchanged by the host devices (10a-10N) and address allocation devices (16a-16N) so that these communication packets will pass through the DHCP proxy during the exchange. Among the types of packets that are reconfigurable by the DHCP proxy are Discovery, Offer, Request, and Acknowledgement packets, all of which are described in the specification with reference to FIG. 3. By reconfiguring the packets so that they pass through the DHCP proxy 40, the network administrator gains control over the communication between the host devices and the address allocation devices through control of the DHCP proxy. Such control enables the network administrator to for example define, manage or control host address allocation, or implement host address allocation policies.

Claim 53 in particular is directed to one method (see FIG. 4), which is nominally performed by a device such as DHCP proxy 40, for handling a request for a network allocation address, for example from a host such as host device 10a-10N. In claim 53, a host identifier, for example a MAC address, is retrieved (Step 62 in FIG. 6) from the request, typically from the ciaddr 24 field (FIG. 2) of the request packet, and is matched (Step 64) with a list of host identifiers, stored for example in a memory 56. If a match is found, the host is maintained in a state of authentication (Step 72). A proxy address (that is, the address of DHCP proxy 40 in this example) is stored (Step 74) in a relay agent field (giaddr 26 in FIG. 2) in the request, and, if the request is from an authenticated host, the request is sent (Step 80) to an address allocation device such as device 16a-16N. A response is received (Step 82) from the address allocation device (e.g., 16a-16N), and a value in the server identifier field (siaddr 22) of the response is modified (Step 76) to match the proxy address (DHCP proxy 40 in this example). The response is sent to the host (e.g., 10a-10N) in Step 84.

Claim 60 is directed to a method for handling a DHCP discovery packet, which method is explained with reference to FIG. 6. According to claim 60, a host identifier is retrieved from the discovery packet (Step 62 in FIG. 6). The host identifier can be a MAC address, password, source address, user name or similar identifies, as explained in page 9, line 16. The host identifier is matched with a list of host identifiers (Step 64), and, if a match is found, the associated host (e.g., 10a-10N) is maintained in a state of authentication (Step 72). Otherwise, the host is maintained in a state inauthentication (Step 70). A proxy address—for example, DHCP proxy 40—is inserted in a gateway IP address (GIADDR) field in the discover packet (Step 74), and, if the host is in the authenticated state, the discovery packet is transmitted to an

address allocation device such as device 16a-16N (Step 80). A DHCP offer packet is received from the address allocation device (Step 82) and a value in a server identifier address (SIADDR) field in the offer packet is modified to match the proxy address (Step 76). The offer packet is transmitted (e.g., 10a-10N) in Step 84.

Claim 67 is directed to an apparatus, for example DHCP proxy 40, for handling a request for a network address allocation. An example of such an apparatus is described with reference to FIGS. 5A and 5B in the specification. Claim 67 recites various modules for performing functions set forth in the claim. Such modules are consistent with software and/or hardware implementations of the inventive procedures involved. Claim 67 recites a host identifier retrieving module, whose functionality is described in p. 9, ll. 13-5; a host identifier matching module, which can be in the form of a parser 92 (p. 13, ll. 13-16); a host state maintenance module, whose functionality is described in p. 9, l. 20-p. 10, l. 15; a relay agent address field proxy address insertion module, such as a packet composer 100 (p. 13, ll. 13-16); a request transmission module, described in p. 16, ll. 10-11; an address allocation device (e.g., 16a-16N) response receiving module configured to receive a response from said address allocation device, whose functionality is described in p. 16, ll. 14-15; a server identifier field proxy address insertion module, such as packet composer 100 (p. 13, ll. 13-16); and a response transmission module, whose functionality is described in p. 16, ll. 14-16 and 20-22.

Claim 74 is directed to an apparatus, for example DHCP proxy 40, for handling a DHCP discovery packet, an example of which is also described with reference to FIGS. 5A and 5B. Claim 74 recites a host identifier retrieving module, whose functionality is described in p. 9, ll.

13-15; a host identifier matching module, which can be in the form of a parser 92 (p. 13, ll. 13-16); a host state maintenance module, whose functionality is described in p. 9, l. 20-p. 10, l. 15; a GIADDR field proxy address insertion module, such as a packet composer 100 (p. 13, ll. 13-16); a DHCP discovery packet transmission module coupled to the GIADDR field proxy insertion module, described in p. 16, ll. 10-11; an address allocation device (e.g., 16a-16N) DHCP offer packet receiving module, whose functionality is described in p. 16, ll. 14-15; an SIADDR field proxy address insertion module, such as packet composer 100 (p. 13, ll. 13-16); and a DHCP offer packet transmission module, whose functionality is described in p. 16, ll. 14-16 and 20-22.

Claim 81 is a means-plus-function claim under 35 U.S.C. 112, sixth paragraph. It relates to an apparatus, such as DHCP proxy 40, for handling a request for a network address allocation and recites various means, which may be hardware and/or software in nature, for performing functions that loosely correspond to those of the modules of claim 67. Claim 81 includes means for retrieving a host identifier from the request, which loosely corresponds to the host identifier retrieving module of claim 67, whose functionality is described in p. 9, ll. 13-5; means for matching the host identifier with a list of host identifiers, corresponding to parser 92 (p. 13, ll. 13-16); means for maintaining a state of authentication, loosely corresponding to the host state maintenance module of claim 67, whose functionality is described in p. 9, l. 20-p. 10, l. 15; means for inserting a proxy address in a relay agent address field in the request, corresponding to packet composer 100 (p. 13, ll. 13-16); means for transmitting the request to an address allocation device, loosely corresponding to the request transmission module of claim 67 and described in p. 16, ll. 10-11; means for receiving a response from the address allocation device (e.g., 16a-16N), loosely corresponding to the address allocation device response receiving

module of claim 67, whose functionality is described in p. 16, ll. 14-15; means for modifying a value in a server identifier field in the response to match the proxy address, corresponding to packet composer 100 (p. 13, ll. 13-16); and means for transmitting the response to the host associated with said host identifier, loosely corresponding to the response transmission module of claim 67, whose functionality is described in p. 16, ll. 14-16 and 20-22.

Claim 88 is directed to an apparatus, such as DHCP proxy 40, for handling a DHCP discovery packet and recites various means, which may be hardware and/or software in nature, for performing functions that loosely correspond to those of the modules of claim 74 . Claim 88 includes means for retrieving a host identifier from the DHCP discovery packet, which loosely corresponds to the host identifier retrieving module of claim 74, whose functionality is described in p. 9, ll. 13-15; means for matching the host identifier with a list of host identifiers, corresponding to parser 92 (p. 13, ll. 13-16); means for maintaining a state of authentication for a host associated with the host identifier if a match is found, loosely corresponding to the host state maintenance module of claim 74, whose functionality is described in p. 9, l. 20-p. 10, l. 15; means for inserting a proxy address in a gateway IP address (GIADDR) field in the DHCP discovery packet, corresponding to the GIADDR field proxy address insertion module of claim 74, such as a packet composer 100 (p. 13, ll. 13-16); means for transmitting the DHCP discovery packet to an address allocation device to issue or renew a host address if the host associated with the host identifier is in a state of authentication, loosely corresponding to the DHCP discovery packet transmission module of claim 74, described in p. 16, ll. 10-11; means for receiving a DHCP offer packet from the address allocation device, corresponding to the address allocation device (e.g., 16a-16N) DHCP offer packet receiving module of claim 74, whose functionality is

described in p. 16, ll. 14-15; means for modifying a value in a server identifier address (SIADDR) field in the DHCP offer packet to match the proxy address, loosely corresponding to the SIADDR field proxy address insertion module of claim 74, such as packet composer 100 (p. 13, ll. 13-16); and means for transmitting the DHCP offer packet to the host associated with the host identifier, loosely corresponding to the DHCP offer packet transmission module of claim 74, whose functionality is described in p. 16, ll. 14-16 and 20-22.

**Grounds of Rejection to be Reviewed on Appeal**

Whether Claims 67-94 are unpatentable under 35 U.S.C. §101 for allegedly being directed to non-statutory subject matter.

**Argument**

Claims 67-94 were rejected under 35 U.S.C. 101 as allegedly being directed to non-statutory subject matter. The Office Actions cites the discussion relating to data structures in the Interim Guidelines for Examination of Patent Applications (OG Notices: November 2005), Annex IV, Computer-Related Nonstatutory Subject Matter (**APPENDIX A**) in support of this rejection. Applicants respectfully traverse.

**Claims 67-80**

First, claims 67-80 are not directed to data structures. As the Interim Guidelines explain, a data structure is “a physical or logical relationship among data elements, designed to support specific data manipulation functions.” In contrast, Claim 67 for example recites, inter alia, a host identifier retrieving module that is configured to retrieve a host identifier from a network address allocation request. It also recites a relay agent address field proxy address insertion module configured to insert a proxy address in a relay agent address field in the request. These modules may be hardware, software or firmware components. In any case they are not data structures pursuant to the above-quoted definition from the Interim Guidelines and pursuant to a conventional understanding of the term “data structure.”

Moreover, even if, arguendo, the modules were data structures, this would not be determinative because the inquiry would not end there. The next issue that would then need to be resolved, according to the Interim Guidelines, is whether such an alleged data structure falls within the category of descriptive material per se. Only if the response to that inquiry is in the

affirmative—that is, the alleged data structure is descriptive per se—would it be deemed to be non-statutory subject matter.<sup>1</sup> In this case the claims recite structural and functional interrelationships with the other aspects of the invention. A recitation of structural and functional interrelationships is by definition not descriptive per se. In particular, in the example of Claim 67, the host identifier retrieving module is configured to retrieve a host identifier from the request. This is a recited function (retrieving) performed by a component (host identifier retrieving module). Also in claim 67, a request transmission module coupled to a relay agent field proxy address insertion module is configured to transmit the request to an address allocation device to issue or renew a host address if the host associated with the host identifier is in a state of authentication. Again a recited function (transmit) is performed by a first component (request transmission module) in relationship to a second component (address allocation device). The recitation of function and relationship removes the subject material from the purview of non-statutory descriptive per se material. Since the subject matter of Claims 67-80 is not drawn to a data structure and is not descriptive per se material, it is statutory and the rejection under 35 U.S.C. §101 based on the assertion to the contrary should be withdrawn.

#### Claims 81-94

Claims 81-94 is also not directed to a data structure and in any case recites structural and functional interrelationships that remove it from the purview of non-statutory descriptive per se material. In fact, independent Claims 81 and 88 are in means-plus-function format, which by

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<sup>1</sup> (A similar line of inquiry would also need to be pursued to determine if the claimed material is a computer listing per se, and Applicants respectfully submit that the same conclusion reached hereinbelow would follow since the claims recite functionality, which extends beyond mere listing or description).

definition recite functions and are therefore not descriptive per se. Specifically, Claim 81 for example, recites “means for retrieving a host identifier from [a] request” and “means for matching said host identifier with a list of host identifiers.” The first of these means specifies the function of retrieving, and the second means specifies the function of matching. Such recitation falls squarely within the scope of permissible subject matter under 35 U.S.C. §112, paragraph six, and the assertion that it is non-statutory subject matter under 35 U.S.C. §101 is based on an erroneous interpretation of one or both of these provisions.

**Claims Appendix**

67. An apparatus for handling a request for a network address allocation, the apparatus comprising:

a host identifier retrieving module configured to retrieve a host identifier from the request;

a host identifier matching module coupled to said host identifier retrieving module and configured to match said host identifier with a list of host identifiers;

a host state maintenance module coupled to said host identifier matching module and configured to maintain a state of authentication for a host associated with said host identifier if a match is found;

a relay agent address field proxy address insertion module configured to insert a proxy address in a relay agent address field in the request;

a request transmission module coupled to said relay agent field proxy address insertion module and configured to transmit said request to an address allocation device to issue or renew a host address if said host associated with said host identifier is in a state of authentication;

an address allocation device response receiving module configured to receive a response from said address allocation device;

a server identifier field proxy address insertion module coupled to said address allocation device response receiving module and configured to modify a value in a server identifier field in said response to match said proxy address; and

a response transmission module coupled to said server identifier field proxy address insertion module and configured to transmit said response to said host associated with said host identifier.

68. The apparatus of claim 67, wherein said host identifier is a MAC address.

69. The apparatus of claim 67, further comprising a memory configured to store said list of host identifiers.

70. The apparatus of claim 67, further comprising a host identifier list pairing module configured to pair said list of host identifiers with a host information list.

71. The apparatus of claim 67, further comprising a request discarding module configured to discard the request if said host associated with said host identifier is not in a state of authentication.

72. The apparatus of claim 67, further comprising an accounting device querying module configured to query an accounting device to obtain account information for said host associated with said host identifier.

73. The apparatus of claim 67, wherein said relay agent address field proxy address insertion module is further configured to flag an option 82 option in the request.

74. An apparatus for handling a DHCP discovery packet, the apparatus comprising:
- a host identifier retrieving module configured to retrieve a host identifier from the DHCP discovery packet;
  - a host identifier matching module coupled to said host identifier retrieving module and configured to match said host identifier with a list of host identifiers;
  - a host state maintenance module coupled to said host identifier matching module and configured to maintain a state of authentication for a host associated with said host identifier if a match is found;
  - a GIADDR field proxy address insertion module configured to insert a proxy address in a gateway IP address (GIADDR) field in the DHCP discovery packet;
  - a DHCP discovery packet transmission module coupled to said GIADDR field proxy insertion module and configured to transmit the DHCP discovery packet to an address allocation device to issue or renew a host address if said host associated with said host identifier is in a state of authentication;
  - an address allocation device DHCP offer packet receiving module configured to receive a DHCP offer packet from said address allocation device;
  - an SIADDR field proxy address insertion module coupled to said address allocation device DHCP offer packet receiving module and configured to modify a value in a server identifier address (SIADDR) field in said DHCP offer packet to match said proxy address; and
  - a DHCP offer packet transmission module coupled to said SIADDR field proxy address insertion module and configured to transmit said DHCP offer packet to said host associated with said host identifier.

75. The apparatus of claim 74, wherein said host identifier is a MAC address.
76. The apparatus of claim 74, further comprising a memory configured to store said list of host identifiers.
77. The apparatus of claim 74, further comprising a host identifier list pairing module configured to pair said list of host identifiers with a host information list.
78. The apparatus of claim 74, further comprising a request discarding module configured to discard the request if said host associated with said host identifier is not in a state of authentication.
79. The apparatus of claim 74, further comprising an accounting device querying module configured to query an accounting device to obtain account information for said host associated with said host identifier.
80. The apparatus of claim 74, wherein said relay agent address field proxy address insertion module is further configured to flag an option 82 option in the request.
81. An apparatus for handling a request for a network address allocation, the apparatus comprising:
- means for retrieving a host identifier from the request;
  - means for matching said host identifier with a list of host identifiers;

means for maintaining a state of authentication for a host associated with said host identifier if a match is found;

means for inserting a proxy address in a relay agent address field in the request;

means for transmitting said request to an address allocation device to issue or renew a host address if said host associated with said host identifier is in a state of authentication;

means for receiving a response from said address allocation device;

means for modifying a value in a server identifier field in said response to match said proxy address; and

means for transmitting said response to said host associated with said host identifier.

82. The apparatus of claim 81, wherein said host identifier is a MAC address.

83. The apparatus of claim 81, further comprising means for storing said list of host identifiers in a memory.

84. The apparatus of claim 81, further comprising means for pairing said list of host identifiers with a host information list.

85. The apparatus of claim 81, further comprising means for discarding the request if said host associated with said host identifier is not in a state of authentication.

86. The apparatus of claim 81, further comprising means for querying an accounting device to obtain account information for said host associated with said host identifier.

87. The apparatus of claim 81, wherein said means for inserting a proxy address in a relay agent address field further comprises means for flagging an option 82 option in the request.

88. An apparatus for handling a DHCP discovery packet, the apparatus comprising:

- means for retrieving a host identifier from the DHCP discovery packet;
- means for matching said host identifier with a list of host identifiers;
- means for maintaining a state of authentication for a host associated with said host identifier if a match is found;
- means for inserting a proxy address in a gateway IP address (GIADDR) field in the DHCP discovery packet;
- means for transmitting the DHCP discovery packet to an address allocation device to issue or renew a host address if said host associated with said host identifier is in a state of authentication;
- means for receiving a DHCP offer packet from said address allocation device;
- means for modifying a value in a server identifier address (SIADDR) field in said DHCP offer packet to match said proxy address; and
- means for transmitting said DHCP offer packet to said host associated with said host identifier.

89. The apparatus of claim 88, wherein said host identifier is a MAC address.

90. The apparatus of claim 88, further comprising means for storing said list of host identifiers in a memory.
91. The apparatus of claim 88, further comprising pairing said list of host identifiers with a host information list.
92. The apparatus of claim 88, further comprising means for discarding the DHCP discovery packet if said host associated with said host identifier is not in a state of authentication.
93. The apparatus of claim 88, further comprising means for querying an accounting device to obtain account information for said host associated with said host identifier.
94. The apparatus of claim 88, wherein said means for inserting a proxy address in a gateway IP address (GIADDR) field further comprises means for flagging an option 82 option in the request.

**Evidence Appendix**

None.

**Related Proceedings Appendix**

None.


**Appendix A: Interim Guidelines for Examination of Patent Applications**

**(OG Notices: November 2005), Annex IV, Computer-Related Nonstatutory Subject Matter**

An Appeal Brief fee has already been paid with the filing of the first Appeal Brief on March 6, 2006. Therefore, it is believed that no fee is due with this filing. It is believed that the filing date of this Appeal Brief is within the two-month duration that begins on the September 5, 2006 date of receipt of the Notice of Appeal by the Patent Office. Accordingly, no extensions of time are necessary. However, should these beliefs be in error, applicants hereby petition for and authorize the charging of our deposit account No. 50-1698 for any extension of time fee that may be required to render timely the filing of this Appeal Brief.

Respectfully submitted,  
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Dated: 10/31/2006

  
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## ANNEX IV

### Computer-Related Nonstatutory Subject Matter

Descriptive material can be characterized as either “functional descriptive material” or “nonfunctional descriptive material.” In this context, “functional descriptive material” consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of “data structure” is “a physical or logical relationship among data elements, designed to support specific data manipulation functions.” The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) “Nonfunctional descriptive material” includes but is not limited to music, literary works and a compilation or mere arrangement of data.

Both types of “descriptive material” are nonstatutory when claimed as descriptive material per se. Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759. When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

When nonfunctional descriptive material is recorded on some computer-readable medium, in a computer or on an electromagnetic carrier signal, it is not statutory since no requisite functionality is present to satisfy the practical application requirement. Merely claiming nonfunctional descriptive material, i.e., abstract ideas, stored in a computer-readable medium, in a computer, on an electromagnetic carrier signal does not make it statutory. See Diehr, 450 U.S. at 185-86, 209 USPQ at 8 (noting that the claims for an algorithm in Benson were unpatentable as abstract ideas because “[t]he sole practical application of the algorithm was in connection with the programming of a general purpose computer.”). Such a result would exalt form over substance. In re Sarkar, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978) (“[E]ach invention must be evaluated as claimed; yet semantogenic considerations preclude a determination based solely on words appearing in the claims. In the final analysis under § 101, the claimed invention, as a whole, must be evaluated for what it is.”) (quoted with approval in Abele, 684 F.2d at 907, 214 USPQ at 687). See also In re Johnson, 589 F.2d 1070, 1077, 200 USPQ 199, 206 (CCPA 1978) (“form of the claim is often an exercise in drafting”). Thus, nonstatutory music is not a computer component and it does not become statutory by merely recording it on a compact disk. Protection for this type of work is provided under the copyright law.

When nonfunctional descriptive material is recorded on some computer-readable medium, in a computer or on an electromagnetic carrier signal, it is not statutory and should be rejected under 35 U.S.C. § 101. In addition, the examiner should inquire whether there should be a rejection under 35 U.S.C. § 102 or 103. The examiner should determine whether the claimed nonfunctional descriptive material be given

patentable weight. The USPTO must consider all claim limitations when determining patentability of an invention over the prior art. In re Gulack, 703 F.2d 1381, 1385, 217 USPQ 401, 403-04 (Fed. Cir. 1983). The USPTO may not disregard claim limitations comprised of printed matter. See Gulack, 703 F.2d at 1384, 217 USPQ at 403; see also Diehr, 450 U.S. at 191, 209 USPQ at 10. However, the examiner need not give patentable weight to printed matter absent a new and unobvious functional relationship between the printed matter and the substrate. See In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994); In re Ngai, 367 F.3d 1336, 70 USPQ2d 1862 (Fed. Cir. 2004).

**(a) Functional Descriptive Material: “Data Structures” Representing Descriptive Material Per Se or Computer Programs Representing Computer Listings Per Se**

Data structures not claimed as embodied in computer-readable media are descriptive material per se and are not statutory because they are not capable of causing functional change in the computer. See, e.g., Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory). Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure’s functionality to be realized. In contrast, a claimed computer-readable medium encoded with a data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure’s functionality to be realized, and is thus statutory.

Similarly, computer programs claimed as computer listings per se, i.e., the descriptions or expressions of the programs, are not physical “things.” They are neither computer components nor statutory processes, as they are not “acts” being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program’s functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program’s functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035. Accordingly, it is important to distinguish claims that define descriptive material per se from claims that define statutory inventions.

Computer programs are often recited as part of a claim. USPTO personnel should determine whether the computer program is being claimed as part of an otherwise statutory manufacture or machine. In such a case, the claim remains statutory irrespective of the fact that a computer program is included in the claim. The same result occurs when a computer program is used in a computerized process where the computer executes the instructions set forth in the computer program. Only when the claimed invention taken as a whole is directed to a mere program listing, i.e., to only its description or expression, is it descriptive material per se and hence nonstatutory. Since a computer program is merely a set of instructions capable of being executed by a computer, the computer program itself is not a process and USPTO personnel

should treat a claim for a computer program, without the computer-readable medium needed to realize the computer program's functionality, as nonstatutory functional descriptive material. When a computer program is claimed in a process where the computer is executing the computer program's instructions, USPTO personnel should treat the claim as a process claim. See paragraph IV.B.2(b), below. When a computer program is recited in conjunction with a physical structure, such as a computer memory, USPTO personnel should treat the claim as a product claim. See paragraph IV.B.2(a), below.

#### **(b) Nonfunctional Descriptive Material**

Nonfunctional descriptive material that does not constitute a statutory process, machine, manufacture or composition of matter and should be rejected under 35 U.S.C. § 101. Certain types of descriptive material, such as music, literature, art, photographs and mere arrangements or compilations of facts or data, without any functional interrelationship is not a process, machine, manufacture or composition of matter. USPTO personnel should be prudent in applying the foregoing guidance.

Nonfunctional descriptive material may be claimed in combination with other functional descriptive multi-media material on a computer-readable medium to provide the necessary functional and structural interrelationship to satisfy the requirements of 35 U.S.C. § 101. The presence of the claimed nonfunctional descriptive material is not necessarily determinative of nonstatutory subject matter. For example, a computer that recognizes a particular grouping of musical notes read from memory and upon recognizing that particular sequence, causes another defined series of notes to be played, defines a functional interrelationship among that data and

the computing processes performed when utilizing that data, and as such is statutory because it implements a statutory process.

**(c) Electro-Magnetic Signals**

Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in § 101.

First, a claimed signal is clearly not a "process" under § 101 because it is not a series of steps. The other three § 101 classes of machine, compositions of matter and manufactures "relate to structural entities and can be grouped as 'product' claims in order to contrast them with process claims." 1 D. Chisum, Patents § 1.02 (1994). The three product classes have traditionally required physical structure or material.

"The term machine includes every mechanical device or combination of mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result." Corning v. Burden, 56 U.S. (15 How.) 252, 267 (1854). A modern definition of machine would no doubt include electronic devices which perform functions. Indeed, devices such as flip-flops and computers are referred to in computer science as sequential machines. A claimed signal has no physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine.

A "composition of matter" "covers all compositions of two or more substances and includes all composite articles, whether they be results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids." Shell Development Co. v. Watson, 149 F. Supp. 279, 280, 113 USPQ 265, 266 (D.D.C. 1957), aff'd, 252 F.2d 861, 116 USPQ 428 (D.C. Cir. 1958). A claimed signal is not matter, but a form of energy, and therefore is not a composition of matter.

The Supreme Court has read the term "manufacture" in accordance with its dictionary definition to mean "the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labor or by machinery." Diamond v. Chakrabarty, 447 U.S. 303, 308, 206 USPQ 193, 196-97 (1980) (quoting American Fruit Growers, Inc. v. Brogdex Co., 283 U.S. 1, 11, 8 USPQ 131, 133 (1931), which, in turn, quotes the Century Dictionary). Other courts have applied similar definitions. See American Disappearing Bed Co. v. Arnaelsteen, 182 F. 324, 325 (9th Cir. 1910), cert. denied, 220 U.S. 622 (1911). These definitions require physical substance, which a claimed signal does not have. Congress can be presumed to be aware of an administrative or judicial interpretation of a statute and to adopt that interpretation when it re-enacts a statute without change. Lorillard v. Pons, 434 U.S. 575, 580 (1978). Thus, Congress must be presumed to have been aware of the interpretation of manufacture in American Fruit Growers when it passed the 1952 Patent Act.

A manufacture is also defined as the residual class of product. 1 Chisum, § 1.02[3] (citing W. Robinson, The Law of Patents for Useful Inventions 270 (1890)).

A product is a tangible physical article or object, some form of matter, which a signal is not. That the other two product classes, machine and composition of matter, require physical matter is evidence that a manufacture was also intended to require physical matter. A signal, a form of energy, does not fall within either of the two definitions of manufacture. Thus, a signal does not fall within one of the four statutory classes of § 101.

On the other hand, from a technological standpoint, a signal encoded with functional descriptive material is similar to a computer-readable memory encoded with functional descriptive material, in that they both create a functional interrelationship with a computer. In other words, a computer is able to execute the encoded functions, regardless of whether the format is a disk or a signal.

These interim guidelines propose that such signal claims are ineligible for patent protection because they do not fall within any of the four statutory classes of § 101. Public comment is sought for further evaluation of this question.